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EVIDENCE OF ANCIENT FORESTS IN CENTRAL KANSAS.

By H. C. Towner, of Clay Centre.

In the spring of 1874, my attention was called to a specimen of fossil flora, a leaf of *Sassafras cretaceum*, from the sandstone ridge called the "Black Hills," a few miles west from our place. A fragment of *Phyllites Vannouæ*, and several sprigs of *Glyptostrobus gracillimus*, were taken from the same stone which held the larger leaf. During the season of 1874, I was with Prof. Mudge, in the upper Cretaceous; but in the spring of 1875, began a series of explorations with a view of developing, so far as possible, the floral resources of this immediate region. This, with the limited time and means at my command, is a slow work, and hardly yet more than begun; yet, to the present time, I have worked with good success, having developed three different deposits of fossil leaves, numbered in the order of their discovery, and all lying in township 9, range 1, east, in Clay county. The three deposits lie within a radius of about a mile, at an elevation more than 1,500 feet above the sea level, and have already yielded the following genera:

Deciduous.—*Sassafras*, *Aralia*, *Quercus*, *Menispermities*, *Platanus*, *Greviopsis*, *Magnolia*, *Salix*, *Populus*, *Todea*, *Alnus*, *Laurus*, *Liquidambar*.

Evergreens.—*Sequoia*, *Pinus*, *Glyptostrobus*, *Inolepis*.

Palm Family.—*Cycadites*.

I have found these leaves in all shapes—some lying singly, flat and smooth upon the stony matrix, almost perfect; others torn and worn to the last degree, and almost illegible; many rolled up in clusters or concretions; one above another for a dozen thicknesses; and all giving evidence of having been deposited at the bottom of comparatively quiet, smooth waters, as it is only rarely that I find a small fragment bearing ripple-marks. As a matter of course, the substance of the leaf is gone, though in a number of instances I found the woody portion of the stem and large vein in good preservation, after its long sleep of over ten millions of years!

I observed one singular fact, which I found confirmed by Dr. Lesquereux, in his supplement to the "Report on the Cretaceous Flora," namely, that while the different varieties of ancient forest trees were more or less intermingled in all the deposits, still, as a general rule, each particular kind of tree had its own chosen locality; where they grew and flourished through long ages of luxuriant greenness, leading a life of untroubled enjoyment, if we can suppose the vegetable family to enjoy life. Following the rule I have mentioned, the three deposits may be designated as follows: No. 1, *Quercus*; No. 2, *Sassafras*; No. 3, *Aralia*. These three forms are not marked as the only, but as the prevailing, types of their respective localities.

The *Sassafras* appears to be by far the prevailing form. With its kindred type, *Araliopsis*, it occupies nearly all of the No. 2 deposit, and encroaches largely upon the others.

Associated with the deciduous trees we find the evergreens, the conifers represented mostly by their cones and small branches and twigs. In nearly every case, these remains are found within the enveloping matrix, and in nine cases out of ten, in the hard black stone, some of which is so charged with iron as to be proof against any common hammer. This last remark requires a little explanation. In the deposits that I have thus far examined, I have found beneath the surface layer of hard black stone a

second layer of soft brown stone, all sand, the surface stratum being hardened mud.

The latest, and so far one of the most interesting discoveries, is that of a *Cycadites*, in reference to which Dr. Lesquereux writes:

"Now, we have as yet not seen any species of this genus in our Cretaceous. Species of *Cycas* and *Zamites* are abundant, especially in the Jurassic. They are seen also, less numerous, however, in the lowest Cretaceous, and very rarely in the upper and middle Cretaceous. Heer has described one species only from the upper Cretaceous of Greenland," etc.

This would seem to indicate that Palms may have formed part of the forest landscape of ancient central Kansas.

While these researches were being made in Clay county, Mr. Charles Sternberg, a most indefatigable explorer, has sent scores of fine specimens from Fort Harker. In former years Prof. Mudge has made most interesting discoveries on the Saline; and Dr. Lesquereux, in 1872, explored the Dakota group from southern Nebraska far into Kansas. The result of these explorations, thus far, has been to develop the fact, that far back in the dim ages of the forgotten past, there grew and flourished here in central Kansas vast forests, comprising most of the trees that now exist only in the temperate zones, with many others almost as exclusively tropical or semi-tropical; that these forests grew on long, low lands, in the midst of, or on the borders of, the great Cretaceous sea, which then rolled its heaving billows over all of what is now western Kansas. The presence of so many tropical and sub-tropical remains proves that a mild and equable climate obtained from the Gulf of Mexico to the arctic regions, as the fossil remains from the Cretaceous beds prove the existence of a warm, shallow sea.

In several places over the region I have explored, I have found impressions of wood and bark—hundreds of these casts stamped indelibly upon the now solid rock, the wood itself being very rarely preserved. Very few of these impressions of wood are ever found in the same deposit with the leaves, indicating, perhaps, that these fragments may have drifted to some distance from the spot whereon the trees grew. I have seen, in a few instances, rocks of hardened clay and sand, covered with sun-cracks, showing conditions analogous to those which now obtain along our own shores.

Thus, this long line of hills and bluffs now known as the "Dakota group" indicates an ancient shore-line, covered with heavy forests, enjoying a mild, even climate, animated and irradiated by the same sun, moon and stars that now cheer and enliven our landscapes; and, probably, the haunts of many of the monsters whose bones we find fossilized in the chalk and shale of the Cretaceous beds. We have yet, I think, no traces of feathered inhabitants of these primeval forests. No animals roamed beneath their silent shades. They lived, fulfilled their destiny, and passed away, leaving behind them imperishable records of their life and usefulness—literally, "Footprints on the sands of time."

THE RIVER BLUFFS.

By Prof. John D. Parker, of Kansas City.

Chief among influences moulding a people are those derived from Nature. Like odors distilled from flowers, or colors playing in sunbeams, the subtle powers of Nature elude analysis. But as the crystal lake mirrors